Lucas Busta

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Professional Preparation

2016-... **Postdoctoral Research Associate** . . . . . University of Nebraska-Lincoln (UNL)
2011-16 **Ph.D. Chemistry** . . . . . University of British Columbia (UBC)
2007-11 **B.Sc. Chem., Biochem. & Mol. Bio.** . . . . . University of MN-Duluth (UMD)

Research

Research Training

2017 **Science Communication and Policy Bootcamp** (American Institute of Biol. Sci.) . . *7 hrs.*
2017 **Metabolomics Workshop** (UNL Center for Biotechnology and Waters) . . . . . *9 hrs.*
2017 **Social Media and Communicating Science Workshop** (UNL) . . . . . *2 hrs.*
2017 **Workshop on Budget Development** (UNL) . . . . . *2.5 hrs.*
2017 **Write Winning Grant Proposals Seminar** (UNL) . . . . . *7 hrs.*
2016 **Bioinformatics for Evolutionary Biology** (UBC Biology 525D) . . . . . *20 hrs.*
2016 **R Carpentry Workshop** (UBC) . . . . . *12 hrs.*
2012 **Physical and Analytical Chemistry Seminar** (UBC Chemistry 540A) . . . . . *24 hrs.*
2012 **Principles of Chemical Separation** (UBC Chemistry 534) . . . . . *72 hrs.*
2011 **Bioanalytical Chemistry** (UBC Chemistry 533) . . . . . *72 hrs.*
2011 **Advanced Bioorganic Chemistry** (UBC Chemistry 569) . . . . . *72 hrs*

Research Experience

Collaborative Research

2017-... **Asst. Prof. Dylan Kosma** (U. Nevada - Reno., USA)
2016-... **Prof. Yanjun Guo** (Southwest Agricultural U., China) . . . . . [pubs. 6 & 8]
2015-... **Dr. Ulrike Bauer** (U. Bristol., U.K.)
2015-... **Dr. Olga Serra Figueras** (U. de Girona., Spain)
2015-17 **Prof. Yuelin Zhang** (U. British Columbia., Canada) . . . . . [pubs. 3 & 7]
2012-... **Asst. Prof. Jessica Budke** (U. Tenn.-Knoxville, USA) . . . . . [pubs. 1 & 2]

Postdoctoral Research

2016-... **Research area:** ***Specialty fatty acid biosynthesis in crop species***
mentor: Edgar Cahoon, Biochemistry Professor, Center for Plant Science Innovation Director
- Performed *de novo* transcriptome assembly and differential expression analysis
- Heterologously expressed constructs in hairy roots, tobacco, arabidopsis, camelina

Doctoral Research

2011-16 **Research area:** ***Diversity and biosynthesis of plant cuticular waxes***
mentor: Reinhard Jetter, Professor of Chemistry and Botany
- Performed detailed chemical analyses of hundreds of plant wax lipid extracts
- Chemically synthesized standards for structure elucidation and enzyme assay
- Performed comprehensive lit. review and biosynthetic analysis of plant waxes

Undergraduate Research

2008-11 **Research area:** ***Custom data acquisition software design***
advisor: John Evans, Professor of Chemistry
- Developed custom data acquisition and processing software using LabVIEW

Teaching & Mentoring

Training in Education

2016 **Instructional Skills Workshop** (UBC) ..... *24 hrs.*
2016 **Writing Across the Curriculum Workshops** (UBC) ..... *7 hrs.*
2015 **Teaching Assistant Peer-Mentor Training** (UBC) ..... *6 hrs.*
2011 **Teaching Assistant Training** (UBC) ..... *12 hrs.*

Teaching Experience

Guest Lecturer

2017 **UNL Biochemistry 843:** "The plant cuticle" ..... *50 min. lecture*
2017 **UNL Biochemistry 843:** "Membrane hemifusions" ..... *50 min. lecture*
2016 **UBC Chemistry 319:** "Practical skills for chemical research" ..... *30 min. lecture*

Professional Tutor

2016-... **Chemistry and Biology Tutor** (OneClass.com); invited to be an online tutor to help international students transition to the U.S. academic environment, study effectively, and graduate on time by answering questions about subject material ..... *1.5M student base*

Teaching Assistant

2016 **Analytical Chemistry Lecture** (UBC) ..... *90 students, 1 semester*
2015 **Analytical Chemistry Lab** (UBC) ..... *6–12 students, 1 semester*
2013-14 **Organic Chemistry Lab** (UBC) ..... *15 students, 2 semesters*
2012-13 **Analytical Chemistry Lab** (UBC) ..... *6–12 students, 2 semesters*
2011-12 **First Year Resource Centre** (UBC) ..... *5–10 students, 2 semesters*
2009-11 **Analytical Chemistry Lab** (UMD) ..... *20 students, 4 semesters*

Mentoring Experience

2012-17 **Laboratory Skills Mentor** (Mentored graduate students in chromatography, mass spectrometry, and organic synthesis) ..... *6 individuals, >8 hrs. ea.*
2015 **Mentor to new teaching assistants** ..... *2 mentees, 1 semester*

Skill Sets

Technical Skills and Training

Analytical Chemistry

GC-EI-MS, GC-FID: Advanced user ..... *Lipid and amino acid metabolic profiling*
LC-ESI-MS(/MS): Intermediate user ..... *Lipid analysis*

Plant Molecular Biology

Plant crossing: Intermediate ..... *Arabidopsis thaliana*
Binary vector construction: Intermediate user ..... *Overexpression vectors*
Heterologous expression: Intermediate user . *Arabidopsis thaliana, Camelina sativa, hairy roots, Nicotiana benthamiana*

Bioinformatics and Computers

R scripting: Advanced user ..... *Statistical computing and graphics, bioinformatics*
bash scripting: Advanced user ..... *Statistical computing, bioinformatics*
perl scripting: Advanced user ..... *Statistical computing, bioinformatics*
Bioinformatics programs: Intermediate user ..... *Transcriptome assembly and analysis*
Javascript (D3 libraries): Intermediate user ... *Interactive data visualization for complex datasets*
Git(hub), HTML, CSS: Intermediate user ..... *Website and blog design*

LabVIEW: Advanced user ..... *Custom data acquisition and processing*

LaTeX: Advanced user ..... *Professional typesetting and document generation*
Mendeley: Advanced user ..... *Reference collection and management*

Tools Developed

Elemental: A perl script for managing high-quality *de novo* transcriptome assembly using multiple existing assemblers in parallel, BLASTing transcriptomes and acquiring public sequence data to analyze and visualize gene homology and expression patterns `lucasbusta.github.io/resources/elemental`

Languages

2001-... **Fluent in Spanish (Castellano)** reading, writing, speaking

Awards

2017 **F. & M. Loewus Travel Award**: ($200) ..... *Phytochemical Society of North America*
2017 **Best Postdoctoral Poster Award**: ($250) ..... *Phytochemical Society of North America*
2016 **F. & M. Loewus Travel Award**: ($200) ..... *Phytochemical Society of North America*
2015 **Graduate Student Travel Award**: ($500) ..... *UBC*
2013 **Best Oral Presentation Award**: ($250) ..... *Phytochemical Society of North America*
2011 **Casmir Ilenda Award for Outstanding Undergrad. Research** ..... *UMD*
2011 **F.B. Moore Academic and Leadership Award** ..... *UMD*
2010 **American Chemical Society Undergrad. Analytical Chemist of the Year** ..... *ACS*
2010 **Maguire Award for Most Promising Chemistry Student** ..... *UMD*
2009 **Maguire Award for Most Promising Chemistry Student** ..... *UMD*

Academic Service and Outreach

2017-... **Ad hoc reviewer** ..... *Plant Cell Reports*

2017 **Volunteer** ..... *NSF High School Teacher Workshop, UNL, 4 hrs.*
2017 **Volunteer** ..... *NSF Outreach Day, UNL, 3 hrs.*
2017 **Volunteer** ..... *Fascination of Plants Day, UNL, 3 hrs.*
2017 **Volunteer** ..... *Women In Science, UNL, 3 hrs.*

2017 **Poster Fair Judge** ..... *Graduate Student Spring Poster Fair, UNL, 3 hrs.*

2017-... **Member** ..... *National Postdoctoral Association*
2013-... **Member** ..... *Phytochemical Society of North America*

2016-... **Science communicator** ..... *Plants Are Chemists: blog for the lay reader*

Publications

Peer-reviewed publications

in review [9] Yanjun Guo, **Lucas Busta**, Reinhard Jetter*. "Cuticular waxes from five fern species" *ANNALS OF BOTANY*

in review [8] **Lucas Busta** and Reinhard Jetter*. "Moving beyond the ubiquitous: the structural diversity and biosynthesis of specialty plant wax compounds" *PHYTOCHEMISTRY REVIEWS*

2017 [7] Tongjun Sun, **Lucas Busta**, Pingtao Ding, Reinhard Jetter, and Yuelin Zhang*. "Arabidopsis Transcription factors TGA1 and TGA4 regulate salicylic acid and pipecolic acid biosynthesis by modulating the expression of *SARD1* and *CBP60g*." *NEW PHYTOLOGIST*, *in press*

2017 [6] Yanjun Guo†, **Lucas Busta**†, and Reinhard Jetter*. "Composition of cuticular wax differs among organs of *Taraxacum officinale*." *PLANT PHYSIOLOGY AND BIOCHEMISTRY*, 115: 372-379

2017 [5] **Lucas Busta*** and Reinhard Jetter. "The structure and biosynthesis of branched wax compounds on *Arabidopsis thaliana*." *PLANT AND CELL PHYSIOLOGY*, 58(6): 1059-1074

2016 [4] **Lucas Busta**†, Daniela Hegebarth†, Edward Kroc, Reinhard Jetter*. "Changes in cuticular wax coverage and composition on developing Arabidopsis leaves are influenced by wax biosynthesis gene expression levels and trichome density." *PLANTA*, 245(2): 297-311

2016 [3] Pingtao Ding†, Dmitrij Rekhter†, Yuli Ding†, Kirstin Feussner, **Lucas Busta**, Sven Haroth, Shaohua Xu, Xin Li, Reinhard Jetter, Ivo Feussner, Yuelin Zhang*. "Systemic Acquired Resistance Deficient 4 encodes a key enzyme for pipecolic acid biosynthesis." *THE PLANT CELL*, 28(10): 2603-2615

2016 [2] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter*. "Cuticular wax coverage on *Funaria hygrometrica* is similar to vascular plants, but wax composition differs between surfaces of the leafy gametophyte, calyptra, and sporophyte capsule." *ANNALS OF BOTANY*, 118(3): 511-22

2016 [1] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter*. "Identification of β-hydroxy fatty acid esters and primary, secondary-alkanediol esters in cuticular waxes of the moss *Funaria hygrometrica*." *PHYTOCHEMISTRY*, 121: 38-49

Manuscripts in preparation

in prep [11] **Lucas Busta**, Reinhard Jetter, and Ulrike Bauer. "Fine-tuning of epicuticular wax crystal slipperiness in a carnivorous pitcher plant"

Acknowledged in

2017 Eliana Gonzales-Vigil, Charles A. Hefer, Michelle E. von Loessl, Jonathan La Mantia, & Shawn D. Mansfield*. "Exploiting Natural Variation to Uncover an Alkene Biosynthetic Enzyme in Poplar." *THE PLANT CELL*, 29(7)

2017 Yanjun Guo* & Reinhard Jetter "Comparative Analyses of Cuticular Waxes on Various Organs of Potato (*Solanum tuberosum* L.)." *JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY*, 65(19): 3926-3933

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Presentations

Conference Presentations

2017 **Lucas Busta** and Reinhard Jetter: "Digging for buried treasure in a chemical diversity databas", Oral Presentation, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Columbia, MO

2017 **Lucas Busta**, Evan LaBrant, Lindsey Grimes, Patricia Santos, Dylan Kosma, Edgar Cahoon: "Bioactivity, structure, and biosynthesis of polyacetylenes", Poster, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Columbia, MO ‡ §

2017 **Lucas Busta**, Evan LaBrant, Edgar Cahoon: "Structure and biosynthesis of bioactive polyacetylenes", Poster, *NEBRASKA RESEARCH & INNOVATION CONFERENCE: PREDICTIVE CROP DESIGN: GENOME TO PHENOME*, Lincoln, NE

2017 **Lucas Busta**, Evan LaBrant, Edgar Cahoon: "Structure and biosynthesis of bioactive polyacetylenes", Poster, *NEBRASKA SYMPOSIUM ON PLANT BREEDING*, Lincoln, NE

2016 **Lucas Busta**, Reinhard Jetter: "Structure and biosynthesis of branched cuticular wax compounds", Poster, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Davis, CA

2015 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Cuticular waxes from the leafy gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, *BOTANICAL SOCIETY OF AMERICA*, Edmonton, AB

2013 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Hydroxy esters from the gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, *PHYTOCHEMICAL SOCIETY OF NORTH AMERICA*, Corvallis, OR ‡

2011 **Lucas Busta**, Evan Anderson, John F. Evans: "Development of a Time Domain Reflectometry System for the Determination of Ice Formation on Road and Bridge Surfaces", Oral Presentation, *SPRING UNDERGRADUATE RESEARCH SYMPOSIUM*, University of Minnesota Duluth, Duluth, MN

Invited Presentations

2017 **Lucas Busta** "Now is the most exciting time yet to be a (plant) scientist." NSF Outreach Program presentation, *THE UNIVERSITY OF NEBRASKA - LINCOLN*, Lincoln, NE.

2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, *THE BOYCE THOMPSON INSTITUTE*, Ithaca, NY.

2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, *THE CENTER FOR PLANT SCIENCE INNOVATION*, Lincoln, NE.

‡awarded
§presented in Spanish